

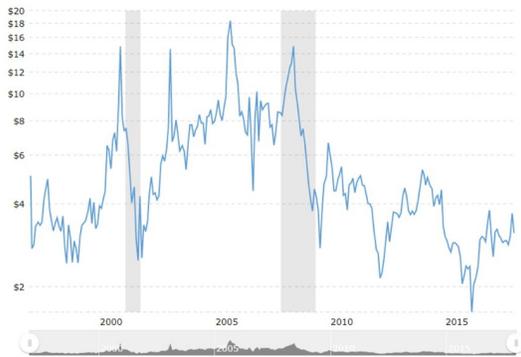


Natural Gas in Underground Storage

The weekly EIA Natural Gas Storage Report advised that there was a withdrawal of 59Bcf from Underground Storage for the week ending November 23d, 2018.

This is 18Bcf below the median forecast of a 77Bcf withdrawal, the average prediction of sector analysts and traders in the Dow Jones Newswires weekly survey. The withdrawal compares with -33Bcf last year and -49Bcf for the five-year average. Storage is **644Bcf below last year** for the same week and **720Bcf below the 5-year average**. Working gas in storage stands at 3,054Bcf. The December Natural Gas contract closed at \$4.72, the highest monthly close of the year.

[Read More](#)



Natural Gas Pricing

As of 10:00AM CST, January 2018, (the *new* prompt month) Natural Gas was trading at \$4.53, $-\$0.16$ from one week ago and the 1-Year Spread average was \$3.20, $-\$0.17$ from one week ago.

Crude Oil Pricing

As of 9:30AM CST, January, 2018, (the *new* prompt month) Light, Sweet Crude on the NYMEX was at **\$51.32**, $-\$2.96$ from one week ago.

*Note that Crude recovered after dropping below \$50 a barrel this morning, subsequent to reports that Russia plans production cuts in tandem with OPEC.

Crude Oil & Natural Gas

INDEX	UNITS	PRICE	CHANGE	%CHANGE	CONTRACT	TIME (EST)	2 DAY
CL1.COM WTI Crude Oil (Nymex)	USD/bbl	51.32	+1.03	-2.05%	Jan 2019	10:30 AM	
CO1.COM Brent Crude (ICE)	USD/bbl	59.49	+0.73	+1.24%	Jan 2019	10:31 AM	
CP1.COM Crude Oil (Tokyo)	JPY/kl	4110.00	+570.00	+1.41%	Apr 2019	10:35 AM	
NG1.COM Natural Gas (Nymex)	USD/MMBtu	4.47	-0.23	-4.96%	Jan 2019	10:30 AM	

U.S. Petroleum Balance Sheet, Week Ending 11/23/2018

Petroleum Stocks (Million Barrels)	Current Week	
	11/23/18	11/16/18
Crude Oil	1,101.0	1,099.5
Commercial (Excluding SPR) ¹	450.5	446.9
Strategic Petroleum Reserve (SPR) ²	650.6	652.6
Total Motor Gasoline ³	224.6	225.3
Reformulated	0.0	0.1
Conventional	24.6	25.1
Blending Components	199.9	200.2
Fuel Ethanol	22.9	22.8
Kerosene-Type Jet Fuel	39.7	39.4
Distillate Fuel Oil ³	121.8	119.2
> 15 ppm sulfur and Under ³	106.5	103.7
> 15 ppm to 500 ppm sulfur	4.3	4.4
> 500 ppm sulfur	10.9	11.2
Residual Fuel Oil	28.7	28.5
Propane/Propylene	81.1	81.8
Other Oils ⁴	284.9	287.9
Unfinished Oils	92.8	93.1
Total Stocks (Including SPR) ^{2,3}	1,904.8	1,904.4
Total Stocks (Excluding SPR) ³	1,254.2	1,251.8

Crude Oil Inventory

US crude inventories **increased by 3.6 million barrels** to 450.5 million barrels for the week ended

November 23d, according to data released this morning by the US Department of Energy. Traders in the Reuters poll projected an increase of 0.8 million barrels.

U.S. Rotary Rigs

U.S. Rotary Rigs drilling for natural gas were unchanged at 194 for the week of November 23d. The number of rigs currently drilling for Natural Gas was +18 from last year. US Rigs drilling for oil were -3 at 885. There are 138 more rigs targeting oil than last year. Canadian rigs were +7 at 204 for the week. Rigs targeting oil remain 82% of all US drilling activity.

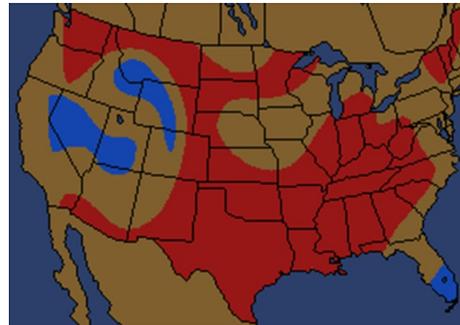
	North American Rig Count			Change		Percent Change	
	11/23/2018	11/16/2018	11/24/2017	Weekly	Annual	Weekly	Annual
Total U.S.	1,079	1,082	923	(3)	156	-0.3%	16.9%
Offshore	25	22	22	3	3	13.6%	13.6%
Land	1,054	1,060	901	(6)	153	-0.6%	17.0%
Inland Waters	2	2	1	0	1	0.0%	100.0%
Oil	885	888	747	(3)	138	-0.3%	18.5%
Percent	82.0%	82.1%	80.9%	-0.0%	1.1%		
Gas	194	194	176	0	18	0.0%	10.2%
Percent	18.0%	17.9%	19.1%	0.0%	-1.1%		
Directional	73	71	71	2	2	2.8%	2.8%
Horizontal	929	939	786	-10	143	-1.1%	18.2%
Vertical	77	72	66	5	11	6.9%	16.7%
Gulf of Mexico	25	22	22	3	3	13.6%	13.6%
Gulf Oil	18	16	18	2	0	12.5%	0.0%
Percent	72.0%	72.7%	81.8%	-0.7%	-9.8%		
Gulf Gas	7	6	4	1	3	16.7%	75.0%
Percent	28.0%	27.3%	18.2%	0.7%	9.8%		
Canada	204	197	215	7	(11)	3.6%	-5.1%
Oil	124	118	107	6	17	5.1%	15.9%
Percent	60.8%	59.9%	49.8%	0.9%	11.0%		
Gas	80	79	108	1	(28)	1.3%	-25.9%
Percent	39.2%	40.1%	50.2%	-0.9%	-11.0%		
North America	1,283	1,279	1,138	4	145	0.3%	12.7%
Prices							
Oil \$/bbl.	\$55.08	\$56.91	\$57.56 (\$1.83)	(\$2.48)		-3.2%	-4.3%
Oil \$/mmbtu	\$9.50	\$9.81	\$9.92 (\$0.32)	(\$0.43)		-3.2%	-4.3%
Gas \$/mmbtu	\$4.56	\$4.20	\$2.95	\$0.36	\$1.61	8.6%	54.6%



Geopolitical

Air Liquide will begin building a \$150m liquid hydrogen production plant in the western US early in 2019: It will be the first world scale liquid hydrogen production unit dedicated to the hydrogen energy markets and have a capacity to produce nearly 30 tonnes of hydrogen per day, which can fuel 35,000 Fuel Cell Electric Vehicles (FCEVs).

Air Liquide has signed a long-term agreement with FirstElement Fuel Inc (FEF), a leader in retail hydrogen



Weather

The AccuWeather 1-5 day Outlook forecasts above-normal temps for the most of the US with the exception of the Western third and East Coast, which will be mostly at normal temps. The 6-10 Day Outlook forecasts all of the US at below-normal temps with the exception of the Southeast, which will be at normal temps and Florida at above-normal. The balance of the country will be at either normal or above-normal temps.

infrastructure in the US, to supply hydrogen to FEF's retail liquid hydrogen fuelling stations in California. There are 35 hydrogen fuelling stations operating in California, with 29 others to follow, according to the California Fuel Cell Partnership. Air Liquide will be able to provide a reliable supply solution to fuel the 40,000 FCEVs expected to be deployed in the state of California by 2022 with this investment.

“This new investment in hydrogen production and our collaborative relationship with FirstElement Fuel, further demonstrate our long-term commitment to the development of...

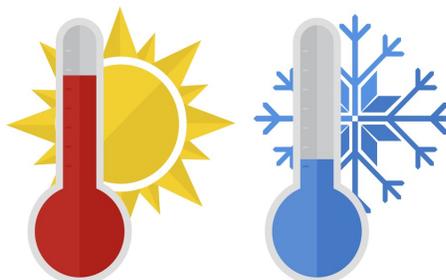
11-15 Day Outlook forecasts the East Coast and part of the West at below-normal temps with the balance of the US at normal temps or above-normal temps. The 30-day Outlook projects normal temps for almost all of the US except the far North Central area and below-normal temps for most of New England. The 90-Day Outlook projects the most of the country at normal temps with the exception of the Northwest, which is expected to be at above-normal temps.

There is no tropical storm activity in the Atlantic Ocean at this time. Hurricane season officially ends this Friday.



Sustainability and Renewables

Wind power is limited in part by how expensive it can be to make each turbine. You may need roughly a ton of rare earth metals per machine... and that adds up. It could soon be much less expensive, however. The EU-backed EcoSwing project recently upgraded a wind turbine in Denmark with superconducting tape that reduces the required amount of rare earth elements to as little as 1kg



This Week's Key Take-Away

November has been colder than average for much of the U.S. but a shift in the jet stream will bring milder temperatures to start December. That said, this break from the cold will be short-lived, so don't get used to the warm temperatures.

The combination of a low-pressure system that will quickly track across the South and off the East Coast

recently **upgraded** a wind turbine in Denmark with superconducting tape that reduces the required amount of rare earth elements to as little as 1kg (2.2lbs). That not only dramatically reduces the costs (down from \$45.50/kg to \$18.70/kg), it reduces weight and size requirements. You can produce the same power for about half the weight and volume of a conventional turbine, the University of Twente's Marc Dhalle told *Chemistry World*.

The tape is made using a ceramic superconducting layer with gadolinium-barium-copper oxide, with a steel ribbon at its back and protection against metal poisoning through layers of magnesium oxide and silver. And cooling isn't an issue -- the EcoSwing team used the same sort of cryo-cooling you normally see in **MRI scanners**...

early next week will bring the return of colder-than-average temperatures in the central and eastern U.S. By next Tuesday or Wednesday, cooler-than-average conditions will return to much of the contiguous U.S. Temperatures are likely to flip back and forth from mild to cold in the Eastern United States during much of December.

Electric wholesale prices are expected to remain relatively low, with the exception of the Mass Hub and California. In California, the storage of Natural Gas continues to be a major issue, 3 years after the major leak at Aliso Canyon and Massachusetts still suffers from a lack of pipelines into the state.

Next Day On-Peak Power (traded for 11/29/2018)		
ISO-NE Mass Hub \$58.50	MISO Indiana Hub \$48.54	NYISO Zone G \$45.00
PJM West Hub \$45.01	ERCOT North \$34.00	CAISO SP15 \$61.00



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